

**Risk Management in the Execution of Decommissioning Programs: A Comparison Of International Approaches – 14535**

Kristan Schruder \*, Mark Pennington \*\*

\* Atomic Energy of Canada Limited

\*\* Sellafield Sites

**ABSTRACT**

Risk is inherent in all organizations and all organizational activities. Risk management plays an integral role in avoiding or reducing risk and in controlling residual risks in decommissioning programs. Accordingly, a process for management of these risks should be applied during the development of the decommissioning work plans and their subsequent implementation.

Sellafield is a large and complex site, with a range of plants and processes on the site, which have been designed and built over a number of years. Newer facilities on the site have been designed with significant thought being given to future decommissioning requirements; however, less consideration has been given to facilitating decommissioning in some older facilities. Sellafield management has arrangements in place to ensure that due consideration is given to all aspects of decommissioning for both older and newer plants. An integral part of these arrangements is Risk Management, which protects the business by maximizing opportunities and minimizing threats providing a framework to control risk at all levels in the organization. Risks are managed in an integrated way across all levels of the organization covering the key interdependencies i.e., strategic, programme, project and operational risk.

Atomic Energy of Canada Ltd (AECL) implements the Nuclear Legacy Liabilities Program on behalf of the Government of Canada. AECL follows an integrated risk management process to provide an approach that assists in either eliminating or suitably managing the risks involved in the NLLP to maximize opportunities and minimize negative outcomes. AECL's Integrated Risk Management (IRM) process covers: Project Risks; Strategic Risks; and Program Risks. The focus of the process is to ensure effective integration of risk management into the organization processes, so that risk management not only protects value, but creates value.

This paper will review the similarities and differences in the risk management processes followed by AECL and Sellafield in the execution of decommissioning programs and identify lessons to be learned.

**INTRODUCTION**

Atomic Energy of Canada Limited (AECL) and Sellafield are responsible for the delivery of complex decommissioning projects. Risk management plays an integral role in avoiding or reducing risk and in controlling residual risks in decommissioning programs. The implementation of a risk management process to manage these risks needs to be applied during the planning and execution of decommissioning projects. Both AECL and Sellafield have risk management procedures to provide direction on how to apply risk management that involves performing a thorough analysis to identify what the team/stakeholders consider as threats and opportunities, and being conscientious in responding to them. Based on the details these processes there are opportunities for both organizations to learn from each to ensure that a robust risk management process is being implemented.

## SELLAFIELD's RISK MANAGEMENT PROCESS

Sellafield's risk management process protects the decommissioning project by maximising opportunity and minimising threat providing a framework to control risk at all levels in the organisation. Whilst not removing the need for experience and judgment, Sellafield's risk management process has a series of well-defined steps to support better decision making through good understanding of threats/opportunities and their likely impact. Risks are managed in an integrated way across all levels of the organisation covering the key interdependencies i.e., strategic and project risk.

The overall purpose of Sellafield's risk management process is to increase the likelihood of meeting project and business objectives. In this context risk is the uncertainty in meeting the decommissioning project objectives. The fact that aspects of the business (such as safety, cost, and schedule) are uncertain when planning and executing a decommissioning project means that the actual achievement might be better than planned as well as worse than planned.

The overall process of risk management involves identification, analysis, treatment and monitoring of risks to increase the likelihood of meeting project and business objectives. It involves regular risk workshops. Risk workshops review the full risk register content whilst review meetings generally consider progress on mitigating actions as in the following diagram.

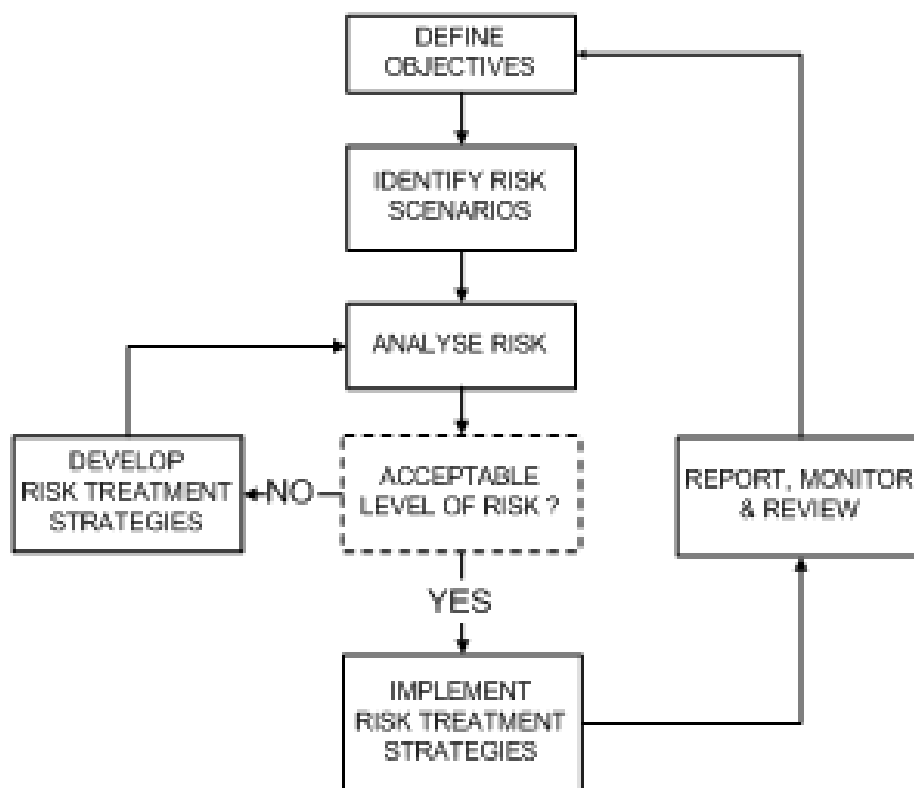


Figure 1 – General Risk Management Methodology

Opportunities arise because actual performance might be better than planned and threats arise because actual performance might be worse than planned. Factors which arise from the adoption of Sellafield's risk management process include:

- Improves the awareness and visibility of the risks.
- Supports effective decision-making under conditions of uncertainty.
- Aids effective communication and visibility to key stakeholders.
- Identifies critical areas for the project to address and to align the available resources to.
- Provides the potential to minimise threats and maximise opportunities.
- Ensures that all foreseeable risks to the decommissioning projects objectives are managed proactively and effectively.
- Alignment of supporting technical development to reduce risk.

Sellafield's risk management process covers five basic elements, as shown in figure 1, which are required to ensure that an effective approach is taken to the management of risk in the decommissioning project:

#### **Define objectives - boundaries for evaluation**

In advance of commencing the risk management process, it is important that the boundaries and interfaces impacting the project, business or site are understood. This information is held within the Risk Management Plan (R.M.P.) which communicates how the risk management strategy is to be effectively applied.

The RMP is an essential component for communicating the risk management process. In essence the plan tells all those concerned who does what, how and how often. The implementation of the risk management process requires that definition be at a certain level of maturity. Where the plan is not yet completed it is important that:

- The priority of objectives and their achievement criteria is available.
- The scope is defined including an understanding of boundaries, interactions.
- Impacting scope, deliverables, timescales and responsibility for execution.
- All assumptions and constraints around objectives and deliverables are clearly defined and underpinned.

#### **Identify the risk**

The first phase of the risk management process is to identify potential risks to the decommissioning project. At the highest level it focuses on identifying the key risks to successful achievement of the business objectives. These are the risks that are most likely to affect the performance and delivery of agreed targets.

Identification of Threats and Opportunities is supported by both formal, informal and ad-hoc capture approaches. Workshops are fundamental for those projects requiring a gathering of key personnel to engage in the identification of threats and opportunities using a structured facilitated approach. Risk Reviews are suitable for smaller forums or one to one reviews

focusing on the update of risk information, the tracking of mitigation responses and the capture of new risks and opportunities during project delivery.

### **Analyse the risks - assessment and quantification**

Having identified the risks you need to assess the likelihood the risk shall occur and, if it does, what shall be the severity of the impact – the Risk Assessment process. The assessment/quantification of risk results in the ability to assign values in the Probability Impact Diagram (P.I.D.).

|                    |      |        |     |          |             |               |     |        |      |           |
|--------------------|------|--------|-----|----------|-------------|---------------|-----|--------|------|-----------|
| -25                | -19  | -15    | -10 | -6       | Very High   | 6             | 10  | 15     | 19   | 25        |
| -20                | -16  | -12    | -8  | -4       | High        | 4             | 8   | 12     | 16   | 20        |
| -15                | -12  | -9     | -5  | -3       | Medium      | 3             | 5   | 9      | 12   | 15        |
| -10                | -8   | -5     | -4  | -2       | Low         | 2             | 4   | 5      | 8    | 11        |
| -7                 | -6   | -3     | -2  | -1       | Very Low    | 1             | 2   | 3      | 6    | 7         |
| Very High          | High | Medium | Low | Very Low | Probability | Very Low      | Low | Medium | High | Very High |
| Opportunity Impact |      |        |     |          |             | Threat Impact |     |        |      |           |

**Figure 2 – Probability Impact Diagram (P.I.D.)**

Scores allow you to focus mitigation efforts on the highest risk including consideration of probability and consequence. All impacts should be based on a quantitative assessment with an absolute value agreed for the likely cost and schedule impacts. It is understood that this will be more imprecise in the early stages of a project where the impact of the risks is difficult to assess with any real precision.

The assessment process supports opportunity as well as threat. Opportunities work in much the same way as threats in that they still have a certain probability of occurrence and a certain expected impact (or benefit). In the case of opportunity, however, the impact is a beneficial one. Any individual impact can be flagged as either a threat or an opportunity, and this can be changed over time - for example a threat could be converted into an opportunity as a result of mitigating responses.

### **Develop and implement the risk treatment strategies**

Once an initial assessment has been carried out, the next step is to define the mitigation plan. The aim of risk mitigation is to reduce the likelihood of a risk occurring, or to reduce the impact of the risk if it does occur. A good mitigating plan may address not just a single risk, but several risks. For example, putting in place a Staff Training Scheme could mitigate a number of risks related to staff morale, turnover, product quality, etc. The underpinning responses come in three types:

- 'Actions': These are required to actively reduce if not remove the risk. If the Action is not being effective then either new actions need to be raised or accept the risk and activate fallback plans in due course.
- 'Controls': These are required to stabilize the Risk from increasing and materializing. Unlike Actions, these types of responses are not designed to reduce or remove risk, however by their very nature sometimes can have that effect.
- 'Fallbacks': These are required as effective recovery plans to be activated either, prior to the risk materializing if it is growing in likelihood and developing into an issue, or once the risk occurs.

### **Report, monitor and review**

Risk management is an ongoing process throughout the life of the decommissioning project involving the following:

- New risks identified as the project status changes and new information becomes available.
- Reassessment of the risk impact as the decommissioning project status changes or as new information becomes available.
- The risk response plans should regularly be reviewed and updated where necessary.
- The Risk Register is a live document, which is constantly being reviewed and updated.
- Ensure that appropriate progress is being made against risk responses, with particular attention to risks with a medium or high impact.

Risk management protects the decommissioning project objectives by maximising opportunity and minimizing threats providing a framework to control risk at all levels in the operating organization. Whilst not removing the need for experience and judgment, risk management is a process that has a series of well-defined steps to support key decision making through good understanding of threats/opportunities and their likely impact. The critical success factors for Sellafield's risk management process include:

- Senior management who support, own and lead on risk management.
- Risk management policies clearly defined and their benefits communicated to all relevant staff.
- Management of risk is fully embedded in the integrated management system.
- Risk management is performed within a defined and approved framework.
- Risk Management supports key decision making.
- Management of risk is closely linked to achievement of the decommissioning project objectives.
- Risks are actively reported, monitored and regularly reviewed.

### **AECL's RISK MANAGEMENT PROCESS**

Process is important when conducting risk management as this ensures that the approach to risk management is both comprehensive and consistent. AECL's IRM process is conducted across the entire NLLP on a regular basis and everyone has a responsibility to continually apply the process when making business decisions and when conducting day-to-day management. AECL's IRM includes the following steps and processes as outlined in Figure 3.



**Figure 3 – AECL's Risk Management Framework**

### **Establishing the Context**

Establishing context helps to define objectives, scope and risk criteria. Context identifies stakeholders; and recognizes limitations imposed on the project and on the risk management process. AECL has identified risk tolerance and risk criteria that are to be applied to the NLLP Projects.

When defining the objectives, the Project Leader defines the level of risks whether they are Project, Strategic or Programmatic levels. When identifying risks the Project Leader establishes both the internal and the external context of the Project. The internal context is the internal surroundings in which the organization looks to achieve its objectives such as people, knowledge, capabilities, standards, guidelines and models adopted by the organization. The external context is the external surroundings in which the organization looks to achieve its objectives, or external risk drivers that are present outside of the organization such as key drivers and trends having impact on the objectives of the organization. A thorough understanding of the organization's internal and external context is the first step in developing the risk register. The final step in establishing the context is to identify the stakeholders who will influence the accomplishment of objectives, to establish who needs to be involved in the IRM process and to consider their position and expectations.

### **Risk Assessment**

Risk assessment is the overall process of risk identification, analysis and evaluation and is defined below.

#### *Risk Identification*

The goal of risk identification is to generate a comprehensive list of risks based on those events that may create, enhance, prevent, degrade, accelerate or delay the achievement of objectives. In risk identification the following is considered:

- Risks are identified to the maximum extent that is practical;

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- Each risk has a single Risk Owner;
- Risks have people with appropriate knowledge involved in identifying risks;
- Early identification of risks is beneficial;
- Risks associated with not pursuing an opportunity are identified as well;
- All risk have events linked to at least one project objective; and
- Risks are not confused with issues. Issues are happening now. They can be drivers to risks, but are not risks themselves. They cannot be avoided, whereas risks are events that have not yet occurred.

### *Risk Analysis*

Risk analysis provides an input to risk evaluation and to decisions on whether risks need to be treated, and on the most appropriate risk treatment strategies and methods. It includes consideration of the causes and sources of risk, their positive and negative consequences, and the likelihood that those consequences may occur.

Analysis is done with varying degrees of detail, depending on the risk, the purpose of the analysis, and the information, data and resources available. The analysis can be qualitative, semi-quantitative or quantitative, or a combination of these, depending on the circumstances. The Risk Owner decides what level of analysis is required to adequately evaluate and decide on a risk response/treatment plan. AECL's Risk Register templates provide the tools required for a Project Evaluation and Review Technique (PERT) analysis.

When analysing risks the following activities are considered:

- Identification of risk drivers and impacts;
- Identification of the controls currently in place; and,
- Assessment of the controls currently in place.

### *Risk Evaluation*

The intention of risk evaluation is to assist in making decisions, based on the outcomes of risk analysis, which risks need treatment and the priority for treatment. Risk evaluation involves comparing the level of risk found during the analysis process with risk criteria established when the context was identified. Based on this comparison, the need for treatment is considered.

In some cases the risk evaluation can lead to further analysis. The risk evaluation can also lead to a decision not to treat the risk in any way other than maintaining existing controls.

### **Risk Response/Treatment**

Risk treatment will involves selecting the required response to the identified risk and then implementing it. If it is decided that the risk will be addressed, a risk response strategy, including a solid action plan, is developed and monitored by the Risk Owner. Risk response strategies describe the detailed steps that must be followed in order to address a risk along with a timeline and resource allocation, if required.

Once the risk response strategy is defined, the residual risk is then assessed and determined if additional risk treatment is required. Risk treatment can also introduce secondary risks; or risks that are a result of the treatment, and that need to be assessed, treated, monitored and

reviewed. Selecting the most appropriate risk treatment option involves balancing the costs and efforts of implementation against the benefits originated from, with regard to legal, regulatory, and other requirements such as social responsibility and the protection of the natural environment.

### **Monitoring and Review**

Both monitoring and review is a planned part of the risk management process. The process of risk reporting ensures that risk registers are updated; risk information informs business priorities; risk response strategies are being implemented; and there is evidence of performance information.

As reporting feeds back into the “establish the context” stage, it is basically the starting point for re-examining risk drivers and re-evaluating risks themselves.

Risk Registers are updated monthly, including any PERT analysis performed. Mitigating actions are identified and updated monthly until the risk has reached its acceptable risk tolerance. All mitigating actions are monitored and tracked to completion.

### **Communication and Consultation**

To ensure all parties understand and are aware of the risks and decisions involved, communication and consultation proactively takes place during the risk management process. This ensures that stakeholder views are integrated into our risk management process and that the risk information generated is effectively shared, and ultimately used.

## **DISCUSSION**

Based on the review of the two risk management processes there are many similarities in the approach to managing risk in the respective decommissioning programs. In both AECL and Sellafield, risk management plays an integral role in avoiding or reducing risk and in controlling residual risks in decommissioning programs. There is a process for management of these risks during the development of the decommissioning work plans and throughout their implementation.

There are two key areas of learning from Sellafield that AECL will consider including in their risk management process: Risk Management Plans; and types of risk treatment strategies. Sellafield's approach to developing a Risk Management Plan early in the process establishes the boundaries under which the risk management will be undertaken and clearly sets the expectations for the Project. This type of document could easily be included into AECL's first step of the risk management process when the context for the Project is established. The second key area of learning that AECL will consider is how Sellafield identifies the three types of risk treatment strategies. Sellafield uses the terminology of “Actions”, “Controls” and “Fallbacks” and provides clear distinction between the three. Although the outcome of the treatment strategies is likely going to be very similar, it would provide team members clarity on the type of risk treatment strategy they should be using.

The main areas of learning from AECL that Sellafield will consider including in their risk management process is the definitions used for the levels of probability and impact on the project objectives and the risk response strategy thresholds.

## **CONCLUSION**

While each risk management procedure provides direction on how to apply risk management, it neither replaces good judgement nor does it provide the risks that should be considered. It is important to remember that risk management involves performing a thorough analysis of context to identify what the team/stakeholders consider as threats and opportunities, and being conscientious in responding to them.

Managing risks is a logical and systematic process that is a tool to support sound decision making, accountabilities and achievement of objectives. It is a skill that needs to be nurtured and developed over time. Risk management is not a stand-alone activity that is separate from the main activities and processes of the organization. Risk management is part of the responsibilities of management and an integral part of all organizational processes, including strategic planning and all project and change management processes.

AECL's and Sellafield's risk management processes aim to enhance the organization's ability to meet its strategic and operational objectives in their decommissioning programs. As well, provide boards, executive and management with valuable insights and information that support improved decision making and planning.

## **REFERENCES**

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